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NOTES ON GEOGRAPHIC DISTRIBUTION

Distribution extension of *Glyphobothrium zwerneri* Williams & Campbell, 1977 (Tetraphyllidea: Serendipeidae) from the cownose ray *Rhinoptera bonasus* (Mitchill, 1815) (Myliobatiformes: Myliobatidae) from Campeche, México

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ABSTRACT: The collection of four specimens of *Glyphobothrium zwerneri* extends the geographic distribution of the species from the original locality (Chesapeake Bay, Virginia, U.S.A.) to at least Ciudad del Carmen, Campeche, México, at the southern limit of the Gulf of Mexico. The species is a parasite of *Rhinoptera bonasus*, a stingray that is thought to migrate within a wide range, suggesting that conservation efforts should be consistent within the stingray's range, just as is necessary for birds and other species that migrate.

The biodiversity of helminths, the so-called parasitic worms, is regularly underestimated (Hugot *et al.* 2001; Poulin 2004) and is often overlooked as a component of the diversity of a country unless there are health-related problems with particular species (Brooks and Hoberg 2008). This oversight may be related in part to the many species that have only been reported in the original description, although no estimation of this number has been made. Despite the usefulness of distribution records of parasites to our understanding of the ecology and evolution of their hosts (Poulin 1999), this trend has yet to be reversed (Brooks and Hoberg 2000).

One such species that to date has been reported only once is *Glyphobothrium zwerneri* Williams & Campbell, 1977. The description of the species was based on 53 specimens taken from four of 11 individuals of *Rhinoptera bonasus* (Mitchill, 1815) (Myliobatiformes: Myliobatidae), the cownose ray, collected in Chesapeake Bay, Virginia, U.S.A. Since that date, the species has been mentioned in publications by Brooks and Barriga (1995), Brooks and Evenhuis (1995), Caira *et al.* (1999), Olson *et al.* (1999) and Ruhnke *et al.* (2000), among others, but has not been reported again. Here we provide a second report and a range extension of this obscure species.

Seven stingrays (*Rhinoptera bonasus*), collected by local fishermen, were examined for intestinal helminths as part of a study of the parasites of stingrays of the Yucatán Peninsula, México (Open sea localities: see Pulido-Flores and Monks 2005); five from Ciudad del Carmen, Campeche (18°83′58″ N, 91°49′57″ W) (collected May 2000), one from Champotón, Campeche (19°21′ N, 90°54′ W) (February 1999), and one from Isla Contoy, Quintana Roo (20°48′ N, 86°47′ W) (February 1999). Subsequent to these, four stingrays were collected in April 2005 from Laguna de Términos, South of Isla Ciudad del Carmen, Campeche (center of lagoon located at 18°36′ N, 91°33′ W). Individual stingrays were maintained on ice until necropsied, when the intestinal tract removed and examined according to Monks *et al.* (1996). The Monogenea (ectohelminths) were reported by Pulido-Flores and Monks (2005), but the endohelminths remained unprocessed until this present study. One of the nine stingrays (a male; May 2000) from the region of Ciudad del Carmen, Campeche, was infected with four specimens of *G. zwerneri*. Worms were fixed in AFA (Alcohol, Formalin and Acetic Acid), stored in 70% ethyl alcohol, and latter stained using Mayer's carmalum, cleared in Methyl Salicylate, and mounted in Canada balsam for examination as whole mounts. Specimens were deposited in the Colección Nacional de Helmintos, IBUNAM, Mexico (CNHE-8838) and the Harold W. Manter Laboratory, University of Nebraska-Lincoln, U.S.A (HWML-49760).

Williams and Campbell (1977) described *Glyphobothrium zwerneri* and tentatively placed it into the family Phyllobothridae. The only known member of the genus, from elasmobranchs, has a singular type of scolex (the anterior hold-fast) that is round (ball-like) with four bothridia that are fused to the scolex, each divided into three parallel longitudinal rows of 10-12 loculi (Figure 1).

These specimens were identified as *G. zwerneri* according to diagnosis of Williams and Campbell (1977); scolex globular, with 4 superficial bothridia, each divided into 3 longitudinal rows of loculi, and separated by shallow longitudinal fissures, with margins fused to scolex. Until this account, this species has not been reported again and no other member of the genus has been discovered.

Individuals of *R. bonasus* are thought to move within the limits of the range of the species (Robins and Ray 1986; Fishbase 2012). However, *G. zwerneri* has been absent from previous studies of helminths of stingrays from the Atlantic and Gulf coasts of North America (Cake 1976; Cake 1978; Jensen 2009; Vardo-Zalik and Campbell 2011). Finding the species in the southern Gulf of Mexico suggests that there must be populations that are locally restricted since it has not been reported from the area in between the two localities. Data such as these complicates

attempts to summarize the global range of species that are thought to migrate and, in this case, the geographic range of their helminth parasites. One hypothesis to explain this is that reports from general localities, such as around Isla Ciudad del Carmen, might be a composite of both migrating and resident individuals. In this way, individual stingrays in a sample of from north of the island, in Gulf of Mexico open marine waters, were infected with *G. zwerneri* and stingrays from a sample collected from south of the island, in Laguna de Términos, were not, even though that are not far removed. From these data, one might hypothesize that there are stingrays that are resident within limits of the lagoon (or similar localities) and that species of helminths that are carried by migrating individuals only a few kilometers away (to the north, in this case) may not be transmitted to members of the resident population. The phylogenetic and biogeographic hypotheses of this, as well as related ecological hypotheses, must be studied further for a full understanding of the geographic distribution of *G. zwerneri*. Of course, the same is true for many widely distributed species, both free-living and parasitic.

Figure 1. Scolex of *Glyphobothrium zwerneri* from Rhinoptera bonasus, Campeche, México. Bar = 500 µm.

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